Nonruminant Nutrition: Energy Utilization

693 Effects of enzyme additions to diets with corn- and sorghum-based distillers dried grains with solubles on growth performance and nutrient digestibility in nursery and finishing pigs.

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Two experiments were conducted to determine the effects of enzyme additions on the nutritional value of diets with corn- and sorghum-based distillers dried grains with solubles (DDGS). For Exp. 1, 180 weanling pigs were fed the same starter diet for 10 d and then used in a 27-d growth assay. There were six pigs/pen and six pens/treatment with an average initial BW of 7.5 kg. Treatments were a corn-soy-based control and diets with 30% corn-based (Hudson, SD) and sorghum-based DDGS (Russell, KS) without and with enzymes (a cocktail of beta-glucanase, xylanase, alpha-amylase, and pectinase to supply 150, 4,000, 1,000, and 25 units of activity, respectively, per kg of diet). Pigs fed the control diet had greater ADG and digestibility of DM, N, and GE ($P < 0.003$) than pigs fed the DDGS treatments. Addition of enzymes improved ADG and decreased ADFI for pigs fed corn-based DDGS (DDGS source x enzyme interaction, $P < 0.08$). However, addition of enzymes improved G:F ($P < 0.08$) and digestibility of DM ($P < 0.04$) regardless of DDGS source. For Exp. 2, 330 finishing pigs (avg BW of 64 kg) were used in a 65-d growth assay. There were 11 pigs/pen and six pens/treatment. Treatments were the same as in Exp. 1 but 40% DDGS were used for the finishing experiment. Pigs fed the control diet had greater ADG and ADFI and digestibility of DM, N, and GE ($P < 0.008$) than pigs fed the DDGS treatments. Pigs fed the corn-based DDGS treatments had greater G:F, digestibility of DM, N, and GE, and iodine value of jowl fat than pigs fed the sorghum-based DDGS treatments ($P < 0.04$). Enzymes improved digestibility of DM, N, and GE ($P < 0.007$), especially for diets with sorghum-based DDGS (DDGS source x enzyme interaction, $P < 0.10$). In conclusion, rate of gain and nutrient digestibility were decreased with addition of DDGS to diets for nursery and finishing pigs but adding enzymes partially restored those losses.

Key Words: Pig, Distillers Dried Grains, Enzyme Supplementation

694 A multi-substrate enzyme blend for weaned pigs fed corn- or wheat-barley- based diets and its relationship with water acidification.

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Different non-starch polysaccharides (NSP) exist in corn- or wheat-barley- based diets. This study evaluated the efficacy of a proprietary enzyme blend for both diet types. Two enzyme blends (A; B) targeting multiple NSP substrates were prepared based on *in vitro* studies. The blends were used in two pig studies conducted at two research locations. Exp. 1 used 900 weaned pigs (BW 6.2kg) allocated to 36 pens (25 pigs/pen, 9 pens/treatment, 4 treatments total) at a Manitoba facility. The same phase 1 (0.5kg/pig) and 2 (1.5kg/pig) diets were given to all pigs. In phases 3 and 4, a wheat-barley based control diet was supplemented with a commercial xylanase, Blend A, or Blend B at 0.75, 0.5, or 0.5 kg per tonne, respectively. The trial lasted for 46 days. Exp. 2 was conducted at a Quebec facility, with 918 weaned pigs (BW 5.6kg) allocated to 54 pens (17 pigs /pen, 9 pens/treatment, 6 treatments total). The same phase 1 and 2 diets were given to all pigs. In phases 3 and 4, a factorial study of 3 (enzymes) × 2 (with or without water acidification) was conducted. A corn-based control diet was supplemented with a commercial enzyme (xylanase/glucanase, 1.0kg/tonne) or Blend B (0.5kg/tonne). A water acidifier was used at 500ml per1000kg water. The trial lasted for 42 days. In Exp. 1, Blend B improved overall feed efficiency (FE, $P < 0.03$) compared with the Control (4.7%), the commercial xylanase (5.7%) or Blend A (5.1%) respectively. In Exp. 2, both enzymes significantly improved ADG (7%, $P < 0.01$) and FE (4%, $P < 0.001$) at week 3. The overall performance was similar in all treatments ($P > 0.05$). The acidifier only improved FE (2%, $P < 0.046$) at week 5. There was no interaction between acidification and enzymes ($P > 0.05$). These results demonstrated the potential to use one common enzyme blend for both diet types in weaned pigs, and the response was more pronounced in wheat-barley based diets than in corn-based diets.

Key Words: Weaned Piglets, Enzymes, Multi-Substrate

695 Gastrointestinal ecology of piglets fed diets containing non-starch polysaccharide hydrolysis products and egg yolk antibodies upon challenge with *Escherichia coli* (K88).

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Gastrointestinal ecology (GE) of piglets fed diets containing non-starch polysaccharide hydrolysis products (HP) and egg yolk antibodies (EYA) against K88 fimbriae upon oral challenge with enterotoxigenic *E. coli* K88 (ETEC) was studied. The HP were generated by incubating a mixture of ethanol-extracted wheat, soybean meal, canola meal and flax with a blend of carbohydrase enzymes. Forty, 21-d old pigs housed in pairs were assigned one of four diets: control (C; devoid of feedstuffs used to generate HP), C + 5 g of HP/kg (HP), C + 5 g of EYA/kg (EYA) or C + 5 g of EYA + 5 g of HP/kg (EYA + HP) in a completely randomized design to give 5 pens per diet. Piglets were fed the experimental diets for 9 d adaptation period. On d 10 all piglets were orally challenged with ETEC. The incidence and severity of diarrhea was determined on a pen basis using a fecal scoring system (1 = no diarrhea to 5 = liquid diarrhea) at 0 h (1 h before challenge), 6, 24, and 48 h post-challenge. At 24 and 48 h post-challenge pigs (1 pig/pen on each occasion) were sacrificed to collect digesta and intestinal tissue. Compared to pigs fed the C diet, pigs fed additives showed low ileal adherent ETEC counts (4.7 vs. 5.5 log10 cfu/g; $P = 0.01$), low digesta ammonia concentration (104 vs. 132 mg/l; $P = 0.002$) and high villi height to crypt depth ratio (2.3 vs. 1.9; $P = 0.05$) which coincided with less (2 vs. 4; $P = 0.01$) scours within 48 h post-challenge. Feeding HP and EYA in combination resulted in higher ($P = 0.0001$) ileal lactic acid than when fed singly whilst pigs fed diets containing HP showed lower gastric pH ($P = 0.03$) and higher ileal adherent lactobacilli counts ($P = 0.01$) than pigs fed the C diet. In conclusion, the results show that HP and EYA modified piglet GE in the presence of ETEC which may explain the mechanisms through which these additives attenuate ETEC-induced secretory diarrhea in piglets.

Key Words: Egg Yolk Antibodies, Piglet Gastrointestinal Ecology, Non-Starch Polysaccharides Hydrolysis Products

696 Expression profiles of iron-related genes in the intestine and liver of young pigs fed three types of dietary inulin. K. Yasuda*[1], H. D. Dawson[2], E. Wasmuth[1], K. R. Roneker[1], K. Kohn[2], C. Chen[2], J. F. Urban[2], R. M. Welch[3], D. D. Miller[1], and X. G. Lei[1], [1]*Cornell University*, *Ithaca, NY*, [2]*USDA-Beltsville Human Nutrition Research Center*, *Beltsville, MD*, [3]*USDA-ARS U.S. Plant, Soil and Nutrition Laboratory, Cornell University*, *Ithaca, NY*.

Dietary inulin has been shown to improve hemoglobin repletion efficiency in young anemic pigs. To elucidate the mechanism, we compared the expression of 27 Fe-related genes in intestine and liver of pigs fed three types of inulin (BENEO-Orafti, Tienen, Belgium): P95 (oligofructose), HP (long-chain), and Synergy 1 (50:50 mixture of P95 and HP). A total of 20 pigs (5-wk old) were fed a corn-soybean meal based diet (BD) without supplemental inorganic iron, or the BD plus 4% of Synergy 1, HP, or P95. After 5 wks, all pigs were killed to collect total RNA from the liver and mucosa of duodenum, ileum, cecum, and colon. Relative mRNA expression of the 27 genes was quantified using real-time qRT-PCR (ABI 7700, Applied Biosystems, Foster City, CA) and normalized with levels of four housekeeping genes. Dietary inulin affected ($P < 0.05$) 2 genes in the duodenum, 6 genes in the colon, and 7 genes each in the cecum and liver. An additional 1 or 2 genes were marginally affected ($P = 0.06$ to 0.09) by inulin in each of the five tissues. Gene expression of solute carrier family 11 member 1, lactoferrin, and ferritin showed similar responses to dietary inulin in multiple tissues. In conclusion, expression of Fe-related genes was affected by dietary inulin supplementation in young pigs not only in the large intestines but also in the small intestines and liver. The regulatory mechanism and physiological relevance of these responses need further exploration.
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Key Words: Inulin, mRNA, Gene Expression

697 Variation in chemical composition of soybean hulls. F. F. Barbosa*[1,2], M. D. Tokach[2], J. M. DeRouchey[2], R. D. Goodband[2], J. L. Nelssen[2], and S. S. Dritz[2], [1]*Federal University of Viçosa*, *Viçosa, Minas Gerais, Brazil*, [2]*Kansas State University*, *Manhattan*.

The objective of this study was to examine the variation in chemical composition of soybean hulls. Our goal was to develop regression equations characterizing the nutritive value of soybean hulls for use in swine diets. Samples (n=39) were collected from different processing plants across the U.S. and analyzed for CP, GE, crude fiber (CF), ADF, NDF, fat, ash, Ca, and P. One sample was excluded because it contained approximately 10-times the amount of Ca (5.22% vs a mean of 0.57%) as other samples. The results of chemical analysis of the 38 samples were used to determine maximum, minimum, and mean values on a DM basis. Estimated DE values were calculated according to an equation described by Noblet and Perez (1993). Regression equations among the nutrients also were established. A high correlation was observed between CF and CP, with the CF predicting 94.7% of the variation in CP content ($Y = -1.160x + 55.49$; $R^2 = 0.95$). Crude fiber also was highly correlated to ADF ($Y = 1.256x + 0.612$; $R^2 = 0.96$); NDF ($Y = 1.657x + 2.234$; $R^2 = 0.97$); and estimated DE ($Y = -90.86x + 4819$; $R^2 = 0.94$). A high correlation also was observed between CP and estimated DE ($Y = 74.79x + 521.9$; $R^2 = 0.90$). Lower correlations were observed between ash concentration and Ca and P. Also, lower correlations were observed between GE and all the other nutrients. In summary, the chemical composition of soybean hulls can be highly variable; however, CF content can help explain much of the variation in CP, ADF, NDF, and estimated DE.

Table 1. Nutritional values of soybean hulls on a DM basis

Nutrient	Minimum	Mean	Maximum	SD
Moisture, %	3.39	8.18	9.51	1.16
CP, %	9.90	13.40	29.40	3.99
GE, kcal/kg	4036	4375	4825	177
Est. DE, kcal/kg	1166	1553	2654	365
CF, %	23.90	36.30	39.90	3.35
ADF, %	30.20	46.20	50.50	4.30
NDF, %	41.50	62.40	68.00	5.36
Fat, %	0.70	1.70	4.50	0.90
NFE, %	39.50	42.70	44.90	1.40
Ash, %	4.50	5.30	6.70	0.50
Ca, %	0.46	0.57	0.76	0.06
P, %	0.11	0.16	0.35	0.05

Key Words: Nutritive Value, Soybean Hulls

698 Influence of soybean hulls on active nutrient transport in the gastrointestinal tract of nursery pigs. D. M. Sholly*[1], B. E. Aldridge[1], J. G. Stevens[1], L. L. Snyder[1], J. S. Radcliffe[1], K. E. Bach Knudsen[2], A. L. Sutton[1], and B. T. Richert[1], [1]*Purdue University*, *West Lafayette, IN*, [2]*University of Aarhus*, *Tjele, Denmark*.

Twenty four barrows and 24 gilts (initial BW=5.65 kg) were used to determine the influence of adding soybean hulls (SH) to nursery pig diets on active nutrient absorption. Pigs were weaned at 17 d of age, blocked by BW, sex and ancestry, and housed in individual pens (0.41 × 0.86 m). All pigs were provided ad libitum access to a common, pelleted phase 1 diet (d 0-5) followed by a phase 2 diet (d 6-10) in meal form. Pigs were then fed experimental diets for an additional 15-18 d: 1) Control, C; 2) C + 3% SH; 3) C + 6% SH; and 4) C + 12% SH. Diet C (20.5% CP, 1.1% Lys) was corn-SBM based with 10.75% starch, 5 % lactose, 4% fish meal, and 1.25% soy concentrate. Soy hulls were added to experimental diets in place of starch and soy concentrate. Experimental diets were fed at 9% metabolic BW and intake was adjusted every 4 d. After 15, 16, or 18 d of feeding the experimental diets, pigs were euthanized. Jejunal tissue was removed, mounted in modified Ussing chambers, and active nutrient absorption was estimated based on changes in transepithelial short circuit current (Isc) following mucosal challenges with 10 mM glucose (Glc), phosphorus (P), and glutamine (Gln). Osmotic balance was maintained by adding mannitol to the serosal chamber. Overall ADG (0.36 kg/d), ADFI (0.53 kg/d), G:F (0.68) and active transport of P and Gln were not affected by diet or sex ($P>0.10$). Active Glc transport tended ($P<0.10$) to be increased in pigs fed diets containing 6% SH (59.3 $\mu A/cm^2$) compared to diets with 0 or 3% SH (36.1 $\mu A/cm^2$; 34.2 $\mu A/cm^2$, respectively), with pigs fed diets containing 12% SH (53.8 $\mu A/cm^2$) being intermediate. In summary, enhanced Glc transport observed with the addition of 6% SH could be due to changes in gastrointestinal morphology or an increased abundance of membrane bound SGLT1 resulting from decreased Glc concentrations in the 6% SH diets.

Key Words: Soybean Hulls, Active Nutrient Transport, Pigs

699 Carbohydrate X gut environment modifier interaction in weaned pigs. B. V. Lawrence*, R. J. Harrell, R. A. Anderson, and F. Navarro, *NOVUS International Inc*, *St. Louis, MO*.

A 21-d nursery trial was conducted to evaluate the interaction of carbohydrate source and ACIDOMATRIX™ LowLac (LowLac), a blend of organic acids, MOS, esters of butyrate, and ethoxyquin, in medicated (Carbadox) weaned pig diets. Pigs (6.16±0.98 kg) were blocked by weight and sex to pen (23 pigs/pen). Pens were assigned to one of 5 treatments (6 reps/trt) fed from day 0-21 postweaning in 2 diet phases. Treatments were 1) Ctrl (20/10% lactose) 2) Neg1 (5/2.5% lactose) 3) LowLac (10/2.5% lactose+0.69% Low-Lac), 4) Alt1 (10/2.5% lactose+0.69% Low-Lac+10/7.5% alternate CHO), and 5) Alt2 (5/2.5% lactose+0.69% Low-Lac+15/7.5% alternate CHO). The alternate CHO was a hydrolyzed sugar, predominantly dextrose. Lactose replaced was from whey permeate. Day 0-7 gain was greater ($P<0.01$) for Ctrl (175 g/d) than for Neg1 (115 g/d), Low-Lac (131 g/d) or Alt2 (136 g/d) pigs. Alt1 pigs (167 g/d) gained faster ($P<0.05$) than either Neg1 or Low-Lac pigs. Gain/feed was lower ($P<0.05$) for Neg1 (0.67) and Low-Lac pigs (0.72) than for Ctrl (0.85) and Alt1 (0.82) pigs. Day 7-21 gain and intake were similar ($P>0.10$) among treatments. Gain/feed day 7-21 was lower ($P<0.01$) for Ctrl pigs compared with other treatments. Day 0-21 gain and intake were not different ($P>0.10$) among treatments. Low-Lac pigs had a higher ($P<0.05$) day 0-21 gain/feed (0.79) than Ctrl (0.75) pigs. Alt2 pigs had a higher ($P<0.05$) gain/feed (0.80) than either Ctrl or Neg1 (0.77) pigs. Day 0-7 feed cost/kg (FCKG) gain was not different ($P>0.10$) among treatments averaging $0.986±0.14. Ctrl pigs had the highest day 7-21 FCKG ($0.681), which was higher ($P<0.05$) than for Alt1 ($0.638) and Alt2 ($0.639) pigs which were in turn greater ($P<0.05$) than for Neg1 ($0.564) and Low-Lac ($0.586) pigs. For the 21-d period, Ctrl pigs had a higher ($P<0.05$) FCKG ($0.737) than Alt2 ($0.695), Low-Lac ($0.662) and Neg1 ($0.633) pigs. Alt1 pigs had a similar FCKG ($0.707) compared to Ctrl and Alt2, but higher ($P<0.05$) FCKG than Neg1 and Low-Lac pigs. These results demonstrate importance of CHO source day 0-7 postweaning and suggest use of ACIDOMATRIX Low-Lac with low lactose diets may be economically advantageous.

Key Words: Lactose, Pigs, ACIDOMATRIX

700 Dietary fatty acids can alter markers of inflammation in cartilage and synovial fluid from multiparous sows. C. I. O'Connor-Robison*[1], J. M. Mapes[1], J. D. Spencer[2], and M. W. Orth[1], [1]*Michigan State University*, *East Lansing*, [2]*JBS United*, *Sheridan, IN*.

Dietary long chain polyunsaturated fatty acids (LCPUFA) including arachidonic acid, eicosapentaenioc acid, and docosahexaenoic acid can alter the production of inflammation mediators. The objective of this study was to characterize the effects of dietary LCPUFA supplementation on indices of cartilage degradation and inflammation in porcine IL-1 beta (pIL-1) stimulated porcine articular cartilage explants. Sows (7 sows/trt) were fed either control corn/soybean meal based diets or the control diet supplemented with 0.75% protected LCPUFA (Gromega 365™; JBS United, Sheridan, IN) during gestation and 1.0% protected LCPUFA throughout lactation for a minimum of 4 parities prior to tissue collection. The cartilage explants (6 mm diameter) were biopsied from the right and left humeral-ulnar joints of fourteen sows within 36 h of slaughter. Synovial fluid was collected from the right carpal joint of each sow post-mortem. Cartilage explants were allocated to 24-well culture plates with 2 discs per well, 12 wells/sow and cultured over 72 h. Serum free medium (1 mL/well) consisted of Gibco D-MEM:F-12, amino acids, ascorbic acid, and antibiotics. Explants were incubated at 37°C. Six wells per sow were treated with 10 ng/mL of pIL-1. At 24, 48 and 72 h of culture, media were removed from each well and reserved for analysis. Media were analyzed for proteoglycans (PG), nitric oxide (NO), interleukin-6 (IL-6), and prostaglandin E2 (PGE_2) concentrations. The addition of LCPUFA to the diet tended to decrease PG release compared to control (340 vs. 460 ± 45 μg PG/well) when explants were stimulated with pIL-1 (trt x diet effect; $P=0.075$), suggesting a reduction in cartilage degradation. However, LCPUFA, did not alter NO or IL-6 release. Overall, cartilage enriched with LCPUFA tended to have increased PGE_2 release when stimulated with pIL-1 (430 ± 100 pg/mL) compared to control (180 ± 100 pg/mL; $P=0.09$). There was a trend for the LCPUFA fed sows to have elevated levels of PGE_2 in their synovial fluid (270 vs. 1060 ± 300 pg/mL; $P=0.10$). Thus, dietary LCPUFA supplementation can have an effect on the synthesis of at least some inflammatory mediators in both porcine cartilage and synovial fluid.

Key Words: Swine, Cartilage, Inflammation

701 Effect of pelleting and fat content on energy value of corn for pigs. J. Noblet* and Y. Jaguelin, *INRA, Saint Gilles, France*.

The energy value of ingredients for swine depends on their chemical composition, the technological treatment and the BW of animals. The objective of two trials was to measure the DE content and nutrients digestibility of 5 corn samples either as mash or after pelleting (55-65°C); corns differed mainly for their fat (EE) content. Corn was either fed alone with a minerals and vitamins complement (trial 1, 3 corns; 3 diets) or included at 35% in a basal corn and soybean meal diet (2 corns; 3 diets); in this latter case, the energy value of the basal diet was also measured and the energy value of corn was obtained according to the difference method. Diets (n=6) were fed for 3 wk to pigs weighing 55 kg at the start of the trials (5/treatment) as mash feed or as pellets. Excreta were collected for the last 10 d. Average (min-max) chemical composition of corns (% of DM) was: 1.5 (1.4-1.8) % ash, 9.3 (7.8-11.7) % CP, 6.1 (3.5-10.8) % EE and 68.9 (60.4-73.4) % starch; the GE content was 19.19 (18.42-20.29) MJ/kg DM. Pelleting improved fecal digestibility of nutrients and energy of diets ($P<0.01$); this improvement depended on diet characteristics ($P<0.01$). The average fecal digestibility coefficients (%) of organic matter, energy, crude protein and EE of corns were 89.9 and 91.4, 86.9 and 90.0, 81.0 and 84.0 and 57.0 and 78.1 for mash and pelleted forms, respectively. The corresponding DE contents were 16.66 and 17.26 MJ/kg of DM. The difference in DE value between both presentations depended on corn EE content. The DE value of corn (MJ per kg of DM) can then be predicted as $16.44 + 0.038$ EE and $16.44 + 0.133$ EE for mash and pellet presentations, respectively (EE as % of DM); the corresponding equation for GE was: $17.72 + 0.241 \times$ EE. Data on nutrients digestibility indicate that the improvement in energy digestibility and energy value of corn due to pelleting is exclusively related to a higher EE digestibility. In conclusion, the DE content of corn depends linearly and positively on its EE content and the relationship is dependent on the form of presentation.

Key Words: Pig, Energy Value, Corn

702 Interaction of dietary protein and energy on growth performance in finishing barrows. P. M. Cline*, C. R. Dove, and M. J. Azain, *University of Georgia*, *Athens*.

The objective of this study was to determine the performance response to changes in dietary fat and protein content in finishing barrows. Previous work has shown that increases in dietary energy density result in decreased feed intake. The experiment was conducted in 3 trials of 18 pens each (4 pigs/pen, total n=216). Within each trial, barrows (PIC C42 × 280, initial wt. = 84 kg) were blocked by weight and assigned to one of 9 experimental diets in a 3 × 3 factorial arrangement, with main effects of crude protein (12, 16, 20%, lysine: 0.60, 0.80, 1.00%) and added Fat (1, 6, 11%). The lowest protein diet with 1% added fat, met the NRC recommendations for pigs in this weight range. Body weight, intake and efficiency were determined initially and on d 14 and 28. There were no significant interactions of dietary protein and fat. There was a main effect of dietary protein on gain ($P < 0.02$). Average daily gain increased as dietary protein increased from 12 (1.04 kg/d) to 16% CP (1.12 kg/d), but no further increase was observed at 20% CP (1.12 kg/d). There were no effects of protein level on feed or caloric intake or on gain:feed ratio ($P > 0.10$). There were main effects of dietary fat on gain ($P < 0.05$), caloric intake ($P< 0.01$) and efficiency ($P < 0.01$). Gain was not different in pigs fed 1 (1.06 kg/d) or 6% added fat (1.07 kg/d), but was increased in pigs fed 11% fat (1.15 kg/d). Daily caloric intake was increased as dietary fat level increased from 1 to 11% (10.5, 10.8 and 11.8 Mcal/d). Gain:feed ratio improved linearly with fat addition (0.33, 0.35 and 0.37). Serum urea, determined at the end of the feeding period, increased as dietary protein increased ($P < 0.01$), but was not affected by dietary fat. These results contradict earlier research that demonstrated decreased feed intake with increasing dietary fat level.

Key Words: Energy Intake, Pigs

703 Effect of crude protein concentration and sugar beet pulp on nutrient digestibility, nitrogen excretion, intestinal fermentation and manure ammonia and odour emissions from finisher pigs. M. B. Lynch*, C. J. O'Shea, T. Sweeney, J. J. Callan, and J. V. O'Doherty, *University College Dublin*, *Newcastle, Co. Dublin, Ireland*.

A 2x2 factorial experiment was used to investigate dietary crude protein (CP) (200 vs 150 g/kg) and sugar beet pulp (SBP) (200 vs 0 g/kg) on nutrient digestibility, nitrogen (N) excretion, intestinal fermentation and manure ammonia and odour emissions from 24 boars. Pigs offered SBP-containing diets had a reduced digestibility of N (0.822 vs 0.868; $P<0.05$) and gross energy (0.851 vs 0.872; $P<0.05$) and an increased digestibility of neutral detergent fibre (0.706 vs 0.558; $P<0.001$) compared with pigs offered diets containing no SBP. There was an interaction between CP and SBP on the urine: faeces N ratio. Pigs offered the 200 g/kg CP SBP-based diet reduced the urine: faeces N ratio ($P<0.05$) compared with those offered the 200 g/kg CP diet without SBP. However there was no effect of SBP in pigs offered 150 g/kg CP diets. Manure ammonia emissions were reduced (71.26 vs 107.23 gNH3/g N intake; $P<0.01$), however odour emissions were increased (3544.7 vs 2084.1 OuEm-3; $P<0.05$) when pigs were offered SBP diets. Decreasing dietary CP to 150 g/kg reduced total N excretion (19.96 vs 34.65 g/day; $P<0.001$) and ammonia emissions (76.98 vs 101.51 gNH3/g N intake; $P<0.05$). There was an interaction between dietary CP and SBP on isovaleric acid ($P<0.01$) and branch chain fatty acids ($P<0.001$) in caecal digesta. Pigs offered the 200 g/kg CP SBP-containing diet reduced isovaleric acid and branch chain fatty acids in the caecum compared with pigs offered the 200 g/kg CP diet containing no SBP. However there was no effect of SBP in the 150 g/kg CP diet. In conclusion, pigs offered SBP-containing diets had a reduced manure ammonia emissions and increased odour emissions compared with diets containing no SBP. Pigs offered the 200 g/kg CP SBP-containing diet had a reduced urine: faeces N ratio compared with those offered the 200 g/kg CP diet containing no SBP.

Key Words: Sugar Beet Pulp, Ammonia, Odour

704 Effect of insoluble and soluble dietary fiber on the standardized ileal digestibility of protein and selected amino acids in growing pigs. V. Halas*[1], G. Végvári[2], and L. Babinszky[1], [1]*Kaposvár University*, *Kaposvár, Hungary*, [2]*Corvinus University of Budapest*, *Budapest, Hungary*.

Dietary fiber is a diverse fraction of feed, its mode of action in the digestive process depends on its solubility. Our trial was aimed at studying the effect of insoluble and soluble fiber on the standardized ileal digestibility (SID) of protein (CP) and selected amino acids (AAs).
A total of 24 simple T-cannulated barrows (45 kg LW) were used in 2 replicates. Dietary treatments consisted of supplementing the basal corn-soybean diet with 0, 100, 200, 300 g/kg wheat bran (WB) or sugar beet pulp (SBP) as sources of insoluble and soluble fiber, resp. All diets were formulated according to the NRC (1998) recommendations with 5 g/kg Cr_2O_3. Insoluble and soluble non-cellulosic polysaccharide (I, S) content of the diets was between 61-116 g/kg and 19-127 g/kg, resp. The trial consisted of a 14-day adaptation and a 3x12-hour collection period. The SID of CP and AAs were calculated as AID+EndogenousAA [g/DMI kg]/FeedAA [g/DM kg], where AID is the apparent ileal digestibility of CP or AA. Endogenous CP and AA losses were determined in a separate study. The fiber source and dose effects were analyzed by ANOVA, the effect of dietary S and I content on SID values were computed by linear regression (SAS, 2004).
Inclusion of SBP reduced the SID of CP, Lys, Thr and Trp from .84, .85, .73 and .96 to .76, .78, .58 and .88, resp. Increasing the level of SBP did not change the SID of CP and AAs. Inclusion of WB did not reduce the SID values significantly. Increasing WB from 0 to 300 g/kg reduced the SID of Lys from .85 to .74 ($P\leq.05$). The regression model showed that SID of CP was affected by I and S, SID of Cys by I and SID of Thr and Trp by S ($P\leq.05$).
In conclusion, SBP but not WB reduces the SID of CP and some AAs, however, no dose response was observed. The effect of soluble and insoluble fiber has to be quantified and considered in diet formulation when fiber rich feedstuffs are used.

Key Words: Dietary Fiber, Pig, Digestibility